

# MIT/Industry Consortium on Advanced Automotive Electrical/Electronic Components and Systems

## Consortium Accomplishments - 1996 to Present

- Led successful initiative to develop consensus position among MIT Working Group members on parameters of advanced automotive electrical system
  - Working Group included representatives of Daimler-Benz, General Motors, Ford, Delphi Packard Electric (now Delphi Automotive Systems), AMP Inc., AFL-Automotive Div., United Technologies, Siemens Automotive, Yazaki North America, and MIT
  - MIT Working Group format and conclusions served as model for German Electrical System Forum (Forum Bordnetz)
- Presented Working Group findings to the European community at the VDI Electronic Systems for Vehicles Conference held in Baden-Baden, Germany, on Sept. 12-13, 1996.
- Developed the MAESTrO software tool for the investigation and comparative evaluation of advanced automotive electrical system architectures
  - Distributed MAESTrO Versions 1.3 and 2.0 to all Consortium members in 1996
  - Worked with a professional software firm, Techlogix, Inc., to develop an enhanced version of MAESTrO, Version 3.0, distributed in 1997, and MAESTrO 3.5, completed in June 1998
  - Formed a MAESTrO Users Group which met twice in 1997 to provide MAESTrO use training and to obtain advice on future MAESTrO features
- Organized and presented a special symposium on advanced electrical system architectures at the IEEE Workshop on Power Electronics in Transportation held in Dearborn, MI (USA), on Oct. 25-26, 1996
- Conducted research activities under Consortium sponsorship investigating the following issues:
  1. DC/DC Converters for Dual-Voltage Electrical Systems
  2. High-Power Generation and Starting
  3. MAESTrO 3.5 Development
  4. Electrical System Transient Investigation
  5. Comparative Power Supply Architecture Evaluation
  6. Load-Flow Study of Dual-Voltage System
  7. Dual-Voltage System Protection and Fusing
  8. 42-Volt PowerNet System Management Using Multiplexed Remote Switching
  9. EMI/EMC in Dual-Voltage Electrical Systems
  10. Economic Analysis of Dual-Voltage Automobile Electrical System
- Established a new vehicle test facility at MIT focused on electrical system architectures and component technologies built around a 1997 Ford Sable body-in-white platform donated by Ford
- Established a Consortium home page which is being developed to serve as a clearinghouse for information on advanced automotive electrical system technology for both Consortium members and non-members  
<http://web.mit.edu/consortia/auto-consortium/>
- Published results of study on ultrasonic motors in a technical report distributed to all Consortium members
- Published results of investigation into effects of electrical system voltage rating on power semiconductor cost and performance, distributed as a technical report to all Consortium members

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- Organized a special session of technical presentations at Convergence'98 to be held in Detroit in October 1998 dedicated to the topic of future automotive electrical systems.
- Arranged for a series of invited speakers at recent Consortium meetings who made presentations on a variety of noteworthy topics, including the following:
  - Telecommunications industry experience with 48V dc power distribution (G. Suranyi and G. Mathiesen, Lucent-Bell Labs)
  - Computer power supply industry experience with low-cost power electronics (T. Wilson, Jr., Zytex)
  - Impact of high voltage on automotive electrical connectors (R. Mroczkowski, AMP)
  - Latest results on development of a new lithium solid electrolyte battery suitable for automotive battery applications (Profs. D. Sadoway and A. Mayes, MIT)
  - Impact of high voltage on automotive batteries (R. Johnson, Johnson Controls)
  - Impact of high voltage on automotive electrical fuses (M. Sammons, S. Oh, Littelfuse)
  - Impact of high voltage on automotive power semiconductors (T. Tobin and A. Graf, Siemens, and R. Frank, Motorola)
  - Update on recent activities of Forum Bordnetz (Prof. K. Ehlers, Forum Chair-TU Braunschweig, and F. Schmidt, Daimler-Benz)
  - Review of past activities of SAE Dual/Higher Voltage Vehicle Electrical Systems Committee (M. Hoffman, Ford)
  - Discussion of SAE and ISO standards-making procedures (L. Powell, Delphi Automotive Systems)
  - Review of SAE/UL standards development activities on electric vehicle safety regarding electric shock hazards (G. Hunt, INEEL, and M. Beebe, Applied Safety Technology)
  - Review of USCAR activities on automotive electrical systems and components (C. Hurton, General Motors)
  - Electrical components and system architectures for alternatively powered vehicles (A. Gale, Ford; R. Malcolm, Chrysler; and I. Khan, Delphi)
  - 42 Volt electrical system safety issues (A. Kusko, Failure Analysis Associates)